

ABSTRACT

TITLE: *Effect of straight and angulated abutments on stress and strain around a platform switched implant placed in anterior maxilla-A finite element analysis.*

AIM: *The aim of the present study is to compare the effect of straight (0°) and angulated abutments (15°, 20°, 25°) on stress and strain distribution around a platform switched implant placed in the anterior maxilla using three dimensional finite element analysis.*

MATERIALS AND METHODS: *A three dimensional finite element model of the premaxillary region and a solid 4.3×13 mm implant with platform switched abutment of 3.5 mm diameter was done with various abutment angulations (0°, 15°, 20°, 25°). Simulated occlusal load of 178 N was applied at the centre of incisal edge, along the long axis of each abutment (axial load) and 45° to the long axis of the each abutment (off axis load). The Maximum von Mises stress and strain values around both the cortical and cancellous bone were recorded.*

RESULTS: *The distribution of stress and strain values changed considerably with abutment angulation and loading condition (axial load and off axis load). As angulation increased from 0° to 25° the concentration of von Mises stress and strain values shifted to the cortical layer of the bone on the opposite side of abutment inclination. In 0°, 15°, 20°, 25° abutment angulations the highest von Mises stress and strain values were obtained at the crestal region of the cortical bone around the implant. The maximum von Mises stress and strain value of 40.12 Mpa and 3220 micro strains were recorded for 25° angulated abutment in axial load. The maximum von Mises stress and strain value of 175.48 and 13313 micro strains were recorded for 25° angulated abutment in off axis load.*

CONCLUSION: *The stress and strain values in bone around the platform switched implant increased with an increase in abutment angulation. Stress and strain values increased in off-axis loading than in axial loading. The stress concentration was more in the cortical bone opposite to the abutment inclination, which is usually the buccal bone. So clinically to prevent the crestal bone loss, sufficient thickness of the buccal bone should be evaluated carefully while using angulated abutments.*